

IN THE CLAIMS:

For the convenience of the Examiner, all claims have been presented whether or not an amendment has been made.

1. (Previously Presented) An audio conference server comprising:
managing means operable to manage at least one audio conference among a plurality of audio clients;
receiving means operable to receive real-time audio data from the plurality of audio clients;
mixing means operable to mix the real-time audio data and stored audio data associated with at least one point source into spatialized audio data; and
delivery means operable to deliver the spatialized audio data to one or more of the plurality of audio clients;
wherein the mixing means includes attenuation means operable to provide distance-based attenuation according to a plurality of predetermined sound decay functions, each sound decay function being associated with a respective one of the plurality of audio clients or the at least one point source, and a respective volume/distance relationship.

2. (Cancelled)

3. (Previously Presented) The audio conference server of claim 1, further comprising checking means operable to check a status of a registered owner of the at least one audio conference to determine whether the at least one audio conference still exists.

4. (Previously Presented) The audio conference server of claim 3, wherein the checking means includes a resource audit service, the resource audit service operable when the at least one audio conference is generated by a first application and is being used by a second application.

5. (Previously Presented) The audio conference server of claim 1, wherein the plurality of audio clients includes set-top box audio clients.

- 6. (Previously Presented)** An audio conference server comprising:
- managing means operable to manage at least one audio conference among a plurality of audio clients;
 - receiving means operable to receive audio data from the plurality of audio clients;
 - mixing means operable to mix the audio data into spatialized audio data; and
 - delivery means operable to deliver the spatialized audio data to the plurality of audio clients;
- wherein the mixing means includes attenuation means operable to provide distance-based attenuation according to a plurality of predetermined sound decay functions, each sound decay function being associated with a respective audio client and a respective volume/distance relationship;
- wherein the managing means comprises an audio conference server shell operable to allow a user to interactively interface with the audio conference server, the audio conference server shell including:
- means for providing program access to high level methods for creating and managing a proxy audio conference;
 - means for providing program access to methods for creating and managing a plurality of point source audio clients; and
 - means for providing program access to low level methods for creating and managing said at least one audio conference.

7. (Previously Presented) An audio conference server comprising:

managing means operable to manage at least one audio conference among a plurality of audio clients;

receiving means operable to receive real-time audio data from the plurality of audio clients;

mixing means operable to mix the real-time audio data and stored audio data associated with at least one point source into spatialized audio data; and

delivery means operable to deliver the spatialized audio data to one or more of the plurality of audio clients;

wherein the mixing means includes:

means for identifying a decay function from one of a plurality of pre-defined decay functions and a customized decay function for each of the plurality of audio clients and the at least one point source, the plurality of pre-defined decay functions including an audio big decay function, an audio small decay function, an audio medium decay function, and a constant decay function;

means for determining respective distances between each of the plurality of audio clients and from each of the plurality of audio clients to the at least one point source;

means for determining a weighted value for each of the plurality of audio clients and the at least one point source based on the identified decay function and the respective distances between each of the plurality of audio clients and from each of the plurality of audio clients to the at least one point source;

means for generating a mix table including each of the plurality of audio clients and the at least one point source;

calculating an actual mix for the plurality of audio clients using the mix table; and
refining the actual mix for the plurality of audio clients.

8. (Previously Presented) An audio conference server comprising:

managing means operable to manage at least one audio conference among a plurality of audio clients;

receiving means operable to receive audio data from the plurality of audio clients;

mixing means operable to mix the audio data into spatialized audio data; and

delivery means operable to deliver the spatialized audio data to the plurality of audio clients;

wherein the mixing means includes:

means for identifying a decay function from one of a plurality of pre-defined decay functions and a customized decay function for each of the plurality of audio clients, the plurality of pre-defined decay functions including an audio big decay function, an audio small decay function, an audio medium decay function, and a constant decay function;

means for determining distances between a target audio client and a plurality of source audio clients;

means for determining a plurality of weighted values for each of the source audio clients based on the identified decay function and the distance between each of the source audio clients and the target audio client, wherein each of the weighted values corresponds to a source/target audio client pair;

means for generating a mix table for each of the source/target audio client pairs;

means for calculating an actual mix for the target audio clients; and

means for refining the actual mix for the target audio clients;

wherein the refining means comprises:

a gain control function operable to avoid transmitting excess energy audio data;

a fade in/fade out function operable to avoid the delivery of the audio data in a step-wise manner to a speaker output;

a floating point operation elimination function operable to avoid the performance of floating point multiplication;

a mixing adaption function operable to adapt the actual mix calculation for the target audio client to available CPU resources;

a mixing cut-off function operable to select the nearest talking audio clients for the actual mix; and

a stream audio function operable to prepare stream audio for playing ambient background music or using an audio source forwarded from another conference.

9. (Previously Presented) A method for enabling an audio conference server to provide an application program with multi-point, weight controllable audio conferencing, comprising:

managing at least one audio conference among a plurality of audio clients;
receiving real-time audio data from the plurality of audio clients;
mixing the real-time audio data and stored audio data associated with at least one point source to yield spatialized audio data; and
delivering the spatialized audio data to one or more of the plurality of audio clients;
wherein mixing the audio data to yield spatialized audio data comprises providing distance-based attenuation according to a plurality of predetermined sound decay functions, each sound decay function being associated with a respective one of the plurality of audio clients or the at least one point source, and a respective volume/distance relationship.

10. (Cancelled)

11. (Previously Presented) The method of claim 9, further comprising checking a status of a registered owner of the at least one audio conference to determine whether the at least one audio conference still exists.

12. (Previously Presented) The method of claim 11, wherein checking comprises activating a resource audit service when the at least one audio conference is generated by a first application and is being used by a second application.

13. (Previously Presented) The method of claim 9, wherein the plurality of audio clients includes set-top box audio clients.

14. (Previously Presented) The method of claim 9, wherein managing the at least one audio conference comprises providing program access to high level methods for creating and managing a proxy audio conference using an audio conference server shell.

15. (Previously Presented) The method of claim 9, wherein managing the at least one audio conference comprises providing program access to methods for creating and managing the point source audio using an audio conference server shell.

16. (Previously Presented) The method of claim 9, wherein managing the at least one audio conference comprises providing program access to low level methods for creating and managing the at least one audio conference using an audio conference server shell.

17. (Previously Presented) A method for enabling an audio conference server to provide an application program with multi-point, weight controllable audio conferencing, comprising:

managing at least one audio conference among a plurality of audio clients;

receiving real-time audio data from the plurality of audio clients;

mixing the real-time audio data and stored audio data associated with at least one point source to yield spatialized audio data; and

delivering the spatialized audio data to one or more of the plurality of audio clients;

wherein mixing the audio data to yield spatialized audio data comprises:

identifying a decay function from one of a plurality of pre-defined decay functions and a customized decay function for each of the plurality of audio clients and the at least one point source, the plurality of pre-defined decay functions including an audio big decay function, an audio small decay function, an audio medium decay function, and a constant decay function;

determining respective distances between each of the plurality of audio clients and from each of the plurality of audio clients to the at least one point source;

determining a weighted value for each of the plurality of audio clients and the at least one point source based on the identified decay function and the respective distances between each of the plurality of audio clients and from each of the plurality of audio clients to the at least one point source;

generating a mix table including each of the plurality of audio clients and the at least one point source;

calculating an actual mix for the plurality of audio clients using the mix table; and
refining the actual mix for the plurality of audio clients.

18. (Previously Presented) A computer program product comprising a computer useable medium having computer program logic recorded thereon for enabling an audio conference server to provide an application program with multi-point, weight controllable audio conferencing, the computer program logic comprising:

managing means operable to enable the computer to manage at least one audio conference among a plurality of audio clients;

receiving means operable to enable the computer to receive real-time audio data from the plurality of audio clients;

mixing means operable to enable the computer to mix the real-time audio data and stored audio data associated with at least one point source into spatialized audio data; and

delivery means operable to enable the computer to deliver the spatialized audio data to one or more of the plurality of audio clients;

wherein the mixing means includes attenuation means operable to enable the computer to provide distance-based attenuation according to a plurality of predetermined sound decay functions, each sound decay function being associated with a respective one of the plurality of audio clients or the at least one point source, and a respective volume/distance relationship.

19. (Cancelled)

20. (Previously Presented) The computer program product of claim 18, further comprising checking means operable to enable the computer to check a status of a registered owner of the at least one audio conference to determine whether the at least one audio conference still exists.

21. (Previously Presented) The computer program product of claim 20, wherein the checking means includes a resource audit service, the resource audit service operable when the at least one audio conference is generated by a first application and is being used by a second application.

22. (Previously Presented) The computer program product of claim 18, wherein the plurality of audio clients includes set-top box audio clients.

23. (Previously Presented) The computer program product of claim 18, wherein the managing means comprises means for enabling the computer to provide an audio conference server shell to allow a user to interactively interface with the audio conference server, the audio conference server shell including:

means for enabling the computer to provide program access to high level methods for creating and managing a proxy audio conference;

means for enabling the computer to provide program access to methods for creating and managing a plurality of point sources or audio clients; and

means for enabling the computer to provide program access to low level methods for creating and managing the at least one audio conference.

24. (Previously Presented) A computer program product comprising a computer usable medium having computer program logic recorded thereon for enabling an audio conference server to provide an application program with multi-point, weight controllable audio conferencing, the computer program logic comprising:

managing means operable to enable the computer to manage at least one audio conference among a plurality of audio clients;

receiving means operable to enable the computer to receive real-time audio data from the plurality of audio clients;

mixing means operable to enable the computer to mix the real-time audio data and stored audio data associated with at least one point source to yield spatialized audio data; and

delivery means operable to enable the computer to deliver the spatialized audio data to one or more of the plurality of audio clients;

wherein the mixing means includes:

means for enabling the computer to identify a decay function from one of a plurality of pre-defined decay functions and a customized decay function for each of the plurality of audio clients and the at least one point source, the plurality of pre-defined decay functions including an audio big decay function, an audio small decay function, an audio medium decay function, and a constant decay function;

means for enabling the computer to determine respective distances between each of the plurality of audio clients and from each of the plurality of audio clients to the at least one point source;

means for enabling the computer to determine a weighted value for each of the plurality of audio clients and the at least one point source based on the identified decay function and the respective distances between each of the plurality of audio clients and from each of the plurality of audio clients to the at least one point source;

means for enabling the computer to generate a mix table including each of the plurality of audio clients and the at least one point source;

means for enabling the computer to calculate an actual mix for the plurality of audio clients; and

means for enabling the computer to refine the actual mix for the plurality of audio clients.

25. (Previously Presented) A computer program product comprising a computer usable medium having computer program logic recorded thereon for enabling an audio conference server to provide an application program with multi-point, weight controllable audio conferencing, the computer program logic comprising:

managing means operable to enable the computer to manage at least one audio conference among a plurality of audio clients;

receiving means operable to enable the computer to receive audio data from the plurality of audio clients;

mixing means operable to enable the computer to mix the audio data to yield spatialized audio data; and

delivery means operable to enable the computer to deliver the spatialized audio data to the plurality of audio clients;

wherein the mixing means includes:

means for enabling the computer to identify a decay function from one of a plurality of pre-defined decay functions and a customized decay function for each of the plurality of audio clients, the plurality of pre-defined decay functions including an audio big decay function, an audio small decay function, an audio medium decay function, and a constant decay function;

means for enabling the computer to determine distances between a target audio client and a plurality of source audio clients;

means for enabling the computer to determine a plurality of weighted values for each of the source audio clients based on the identified decay function and the distance between the source audio client and target audio client, wherein each of the weighted values corresponds to a source/target audio client pair;

means for enabling the computer to generate a mix table for each of the source/target audio client pairs;

means for enabling the computer to calculate an actual mix for the source audio clients; and

means for enabling the computer to refine the actual mix for the source audio clients;

wherein the means for enabling the computer to refine the actual mix for the source audio clients comprises:

means for enabling the computer to provide a gain control function to avoid transmitting excess energy audio data;

means for enabling the computer to provide a fade in/fade out function to avoid the

delivery of the audio data in a step-wise manner to a speaker output;

means for enabling the computer to provide a floating point operation elimination function to avoid the performance of floating point multiplication;

means for enabling the computer to provide a mixing adaption function to adapt the actual mix calculation for the target audio client to available CPU resources;

means for enabling the computer to provide a mixing cut-off function to select the nearest talking audio clients for the actual mix; and

means for enabling the computer to provide a stream audio function to prepare stream audio for playing ambient background music or using an audio source forwarded from another conference.

26-44. (Cancelled)

45. (Previously Presented) An audio conference server comprising:

a management module operable to manage at least one audio conference among a plurality of audio clients;

a receiver operable to receive real-time audio data from the plurality of audio clients;

a mixer operable to mix the real-time audio data and stored audio data associated with at least one point source into spatialized audio data; and

a delivery module operable to deliver the spatialized audio data to one or more of the plurality of audio clients;

wherein the mixer includes an attenuation module operable to provide distance-based attenuation according to a plurality of predetermined sound decay functions, each sound decay function being associated with a respective one of the plurality of audio clients or the at least one point source, and a respective volume/distance relationship.

46. (Previously Presented) An audio conference server comprising:

a management module operable to manage at least one audio conference among a plurality of audio clients;

a receiver operable to receive real-time audio data from the plurality of audio clients;

a mixer operable to mix the real-time audio data and stored audio data associated with at least one point source to yield spatialized audio data; and

a delivery module operable to deliver the spatialized audio data to one or more of the plurality of audio clients;

wherein the mixer includes:

an identification module operable to identify a decay function from one of a plurality of pre-defined decay functions and a customized decay function for each of the plurality of audio clients and the at least one point source, the plurality of pre-defined decay functions including an audio big decay function, an audio small decay function, an audio medium decay function, and a constant decay function;

a distance determining module operable to determine respective distances between each of the plurality of audio clients and from each of the plurality of audio clients to the at least one point source;

a weighted value determining module operable to determine a weighted value for each of the plurality of audio clients and the at least one point source based on the identified decay function and the respective distances between each of the plurality of audio clients and from each of the plurality of audio clients to the at least one point source;

a mix table generator operable to generate a mix table including each of the plurality of audio clients and the at least one point source;

a calculator operable to calculate an actual mix for the plurality of audio clients and the at least one point source; and

a refining module operable to refine the actual mix for the plurality of audio clients and the at least one point source.

47. (Previously Presented) A computer executable code for an audio conference server providing multi-point, weight controllable audio conferencing, the code comprising:

a managing section operable to enable management of at least one audio conference among a plurality of audio clients;

a receiving section operable to enable reception of real-time audio data from the plurality of audio clients;

a mixing section operable to enable mixing of the real-time audio data and stored audio data associated with at least one point source into spatialized audio data; and

a delivery section operable to enable delivery of the spatialized audio data to one or more of the plurality of audio clients;

wherein the mixing section includes an attenuation section operable to provide distance-based attenuation according to a plurality of predetermined sound decay functions, each sound decay function being associated with a respective one of the plurality of audio clients or the at least one point source, and a respective volume/distance relationship.

48. (Previously Presented) A computer executable code for an audio conference server providing multi-point, weight controllable audio conferencing, the code comprising:

a managing section operable to enable management of at least one audio conference among a plurality of audio clients;

a receiving section operable to enable reception of real-time audio data from the plurality of audio clients;

a mixing section operable to enable mixing of the real-time audio data and stored audio data associated with at least one point source into spatialized audio data; and

a delivery section operable to enable delivery of the spatialized audio data to one or more of the plurality of audio clients;

wherein the mixing section includes:

an identification section operable to enable identification of a decay function from one of a plurality of pre-defined decay functions and a customized decay function for each of the plurality of audio clients and the at least one point source, the plurality of pre-defined decay functions including an audio big decay function, an audio small decay function, an audio medium decay function, and a constant decay function;

a distance determining section operable to enable determination of respective distances between each of the plurality of audio clients and from each of the plurality of audio clients to the at least one point source;

a weighted value section operable to enable determination of a weighted value for each of the plurality of audio clients and the at least one point source based on the identified decay function and the respective distances between each of the plurality of audio clients and from each of the plurality of audio clients to the at least one point source;

a mix table section operable to enable generation of a mix table including each of the plurality of audio clients and the at least one point source;

a calculation section operable to enable refinement of the actual mix for the plurality of audio clients and the at least one point source; and

a refining section operable to enable refinement of the actual mix for the plurality of audio clients and the at least one point source.

49. (Previously Presented) The audio conference server of Claim 1, wherein at least a portion of the stored audio data is associated with one or more of the plurality of audio clients.